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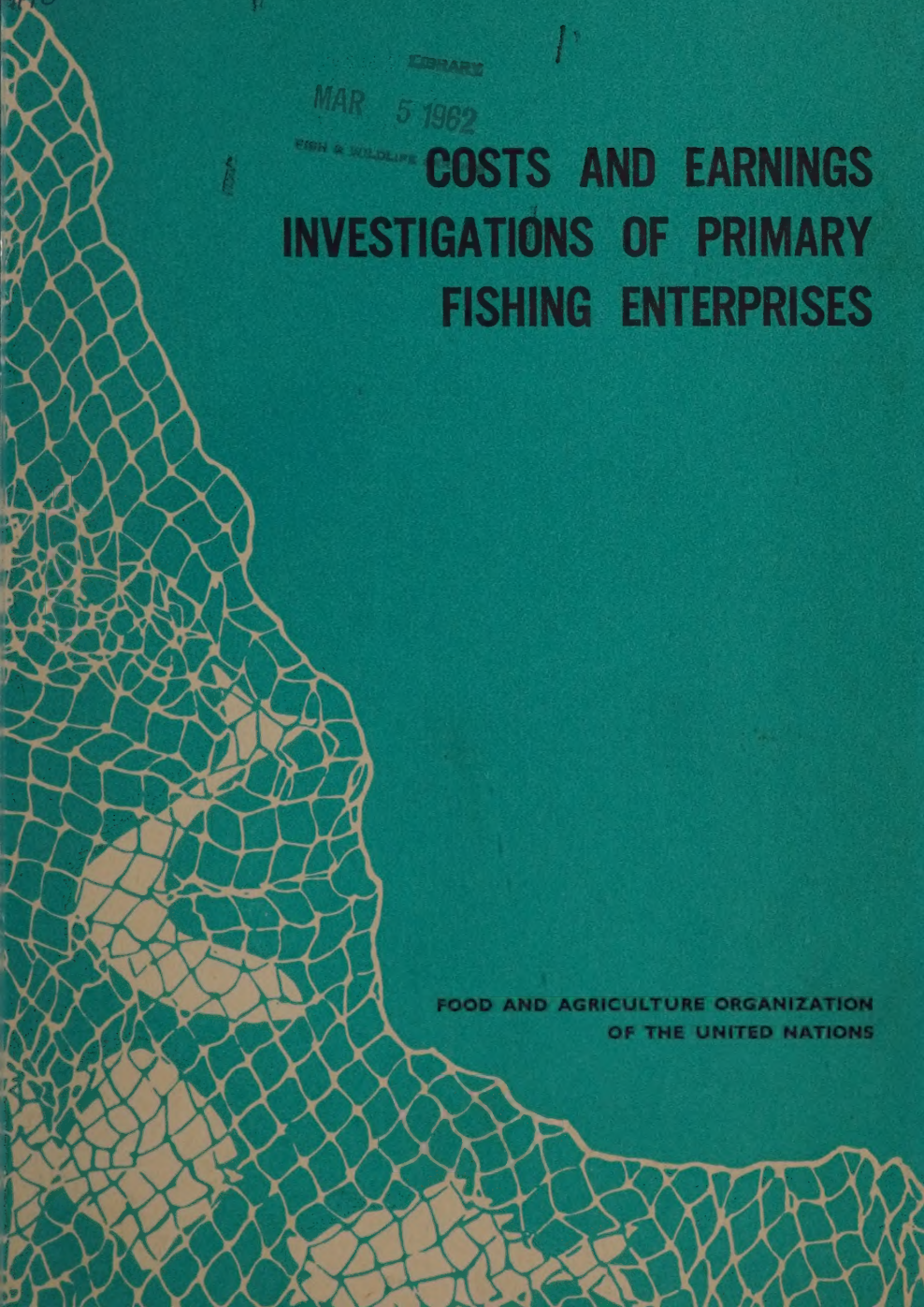

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

COST AND EARNINGS INVESTIGATIONS OF PRIMARY FISHING ENTERPRISES

COSTS AND EARNINGS INVESTIGATIONS OF PRIMARY FISHING ENTERPRISES

A study of concepts and definitions

by

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PREFACE

At the FAO Technical Meeting on Costs and Earnings of Fishing Enterprises held in London during September 1958. part of the discussion was devoted to the concepts, definitions and conventions used in studies undertaken in different countries. A number of papers were submitted under this item of the agenda by persons whose experience in this field of economic research enabled them to write authoritatively on this subject. The papers, drawn from experience in five countries, showed significant differences and similarities in concepts and definitions used. Although some points were clarified in the course of the discussions at the Meeting, not all divergences in practice could be satisfactorily explained. A number of those present at the meeting felt that the subject was one of such importance in national and international research that a committee or study group should be set up to develop uniform concepts and definitions. This proposal, originating in a paper submitted to the meeting by Professor Osterbind of the University of Florida, U.S.A., received general support and at the close of the session a resolution requesting the Food and Agriculture Organization of the United Nations (FAO) to consider the feasibility of including in its program a project on these lines to be carried out in co-operation with experts from the various countries interested in the problem was formally adopted. This booklet is the result of that study.

The author acknowledges the helpful criticism and suggestions received from the experts whom he consulted, particularly Mr. John Proskie and Mr. Blake Campbell, both of the Department of Fisheries of Canada, and Professor Osterbind. The views which this booklet contains are necessarily the author's own, but they have been influenced by the desire to accommodate divergent views held in the various countries provided that this could be done without reaching conclusions wholly incompatible with acceptable nomenclature. The lack of uniformity in the organization of fisheries seems to act as a barrier to agreement on many fishery concepts, a field

in which little pioneering has yet been done; but even if the publication of this study results only in a reappraisal of existing attitudes toward the nomenclature of fishery costs and earnings studies, the author feels his work will have been worthwhile.

Thanks are due to the White Fish Authority, who readily gave their permission for the study to be undertaken and generously provided facilities for preparation of the manuscript, and to the officers of the Economics Branch of FAO's Fisheries Division, whose help and encouragement were invaluable.

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INTRODUCTION

In any comparative science it is desirable to achieve the greatest possible degree of uniformity in the presentation of data and it is of great importance to know what limitations need to be applied in their use. In fishery costs and earnings studies this has particular application now that the results of such studies tend to come under international scrutiny. And not for this reason alone. There is clearly a pressing need for agreed definitions and classifications to establish terminology, which can be accepted as the professional language of those undertaking costs and earnings studies in the fishing industries of the world.

There are, of course, words which, in the course of time, tend to acquire a particular significance and the different professions do not always accept the same shade of meaning in respect of them all. While it may be necessary, therefore, to develop definitions to meet the needs of fishery economists and to employ them in the context of their costs and earnings studies, it is also necessary to ensure that as far as possible the definitions adopted are compatible or consistent with those in use in kindred professions, and in other industries, or in established government practice. One should, however, guard against adhering slavishly to the " conventional wisdom " of government departments, for ofttimes their definitions and conventions are credited with an authority which they have neither sought nor deserve.

The need for costs and earnings information broadly springs from the demand of governments, who may well determine fishery policies on the information thus made available; of gear technologists, and naval architects who are interested in the economic effects of technical innovations; of the industry itself, the members of which are called upon to make the entrepreneurial decisions; of labor organizations, whose interests include securing an improved standard of living for their members; and of private research workers whose activities may be conducted either indepen-

dently or in association with the ultimate users of their research data. It is clear, therefore, that the development of a series of classifications for fishery costs and earnings studies must take account of the diverse needs for which the same basic information may be required. It is insufficient simply to cater for economists as a profession, for the needs of economists will surely vary according to the field in which their research is applied, and the criteria which determine the scope and pattern of the investigation are often not susceptible of simple generalization. Not only, then, is identification of the public for whom the data is required a necessary preliminary to any standardization of classification, but there must also be some fairly detailed assessment of the needs of those various publics so that the costs and earnings studies can be so planned and conducted as to illustrate in the final presentation of data those facets which it is the purpose of the investigation to highlight. This sort of problem is not a new one, and industry, government and private research workers have perforce had to develop their own definitions and classifications; and the result has sometimes been a not altogether satisfactory case study which defies ready correlation with other studies.

Insofar as it is impracticable to meet diverse needs by any single method of enquiry or analysis, there must be recourse to a set of standards which can be adapted for use in any one of a number of varying situations. Agreement on certain basic concepts to be used in all costs and earnings studies may not be so difficult to reach. Account must be taken of existing practices for it will be more difficult to secure adoption of something which differs markedly from what is being done at present. Far reaching changes, therefore, cannot always be obtained because of the understandable reluctance to alter practices which are long established, and also because of the effect of such changes on comparability with the past and the inconvenience and monetary cost of any extra work which might be entailed. It is not unkown for new and old practices to be continued side by side simply because of a reluctance to accept change, but the resulting waste of resources is to be deplored. The greater the ease with which existing practices lend themselves to adaption to newly developed classifications or definitions, the more likely are those new classifications and definitions to be implemented.

This study is concerned with the principal concepts of the elements of primary fishing economies, with the definition of terms commonly used in costs and earnings studies and with the application of those definitions to practical work. Even the designation " primary fishing enterprise "

stands in need of definition because the practical concept may be something quite different from that propounded in theory. It is not unexpected that with uneven development of fisheries economies throughout the world and with some countries focusing attention on particular sections of the primary industry, divergent views on the practical concept of a primary fishing industry may be difficult or even impossible, to reconcile. For this reason a number of qualifications have been found necessary in order to cover the ramifications and diversifications of the different fisheries of the world and, while these may have resulted in the meanings of some of the terms becoming obscure, they have not become entirely lost. It seems inherent in the nature of the task that the greater the parameter the greater the likelihood of such difficulties arising. However, although the study relates mostly to sea fisheries, its parameter has not been deliberately limited.

1. CONCEPT OF THE FISHERY ENTERPRISE

An enterprise in its broad sense is an undertaking, and a fishery enterprise may therefore be understood to mean a business undertaking participating in the exploitation of fishery resources. This concept of an enteprise is too broad and much too imprecise for ready acceptance as a definition in costs and earnings studies and it is therefore necessary to look further into not only the types of undertaking making up the primary fishing interests but also to examine their functions and general organization.

Elements

The elements of any enterprise consist of capital, management and labor and these are expressed in fishery enterprises but perhaps with rather more peculiarities than are usually found nowadays in an economic unit. The way in which the capital element is provided and remunerated depends upon the nature of the capital, e. g., fishing vessel, fishing nets or financial investment, and on the persons who provide it and the part they play in the ordinary working of the enterprise. The elements of management and labor may be provided by those who also provide the capital; or there may be various combinations of both ownership of capital and management and labor elements of which no one form can be regarded as typical. The fishery enterprises in any particular area can usually be classified into groups, each of which will tend to follow the same model. Generally speaking, as the size and complexity of the enterprise increases, so, too, will the degree of specialization and the division of labor, and the likelihood that those contributing capital will also contribute labor will diminish.

In a broad sense the factors of production in the smaller fisheries are usually remunerated by sharing the earnings into two divisions: one to be allocated to the "boat," the other to the crew. Sometimes there may be a

third division allocated to the owners of the fishing gear, but it is rare for these groups of individuals to be separate and distinct from the rest of the enterprise. They are commonly part of it, and the whole field forms a complex pattern of boat and gear ownership which is difficult both to describe and to analyse. In the larger fisheries, the concept of an enterprise takes a more classical form and labor is remunerated on a basis related to the value of the catch but not necessarily constituting a share of it. Most fishery enterprises appear to organize the reward to each factor so as to spread the risk inherent in fishing over all those engaged in the enterprise in preference to allowing the risks to rest wholly with the entrepreneur. The prospect of securing a good catch is one of the traditional features of fishing, and labor finds attractive a share system which remunerates them well when catches are good. With progress in the industrial organization of primary fisheries, the ownership of capital tends to become more concentrated and the resultant ability of entrepreneurs to carry a greater share of the risks has been used by fishing crews to secure minimum levels of remuneration without losing the benefits of sharing arrangements.

Complexities

It is not uncommon in most of the countries engaging in fisheries to find fishermen as a whole employing a multiplicity of fishing methods which vary according to the fishery and the season, and adopting organizational and marketing methods based upon tradition and habit which make it difficult to describe the limit of function of the primary enterprise. Fishing method and kind of fishing are quite distinct concepts and, whereas the former refers specifically to the use of some accepted and clearly defined fishing gear, the latter refers more usually to a particular fishery, or even a single species of fish. The combinations of fishing method and kind of fishing can add materially to the difficulties of securing satisfactory analyses of costs and earnings data.

These conceptual problems are present in greater or lesser degree in all the commercial fisheries, but they are easier to overcome in these sections of the primary industry where there has been progress in rationalization and consequently in industrial organization. Sport-fisheries, since those engaging in them do not depend on their catches for a livelihood, are quite separate from the normal concept of a fishery enterprise. The owners of sport-fisheries receive principally a rent income, the nature of which is fundamentally different from the income accruing to commercial fisheries,

and for the purpose of this study they will not be considered as forming part of the primary fishing industry. Subsistence fisheries, are also different in nature, since the "income" received from fishing activity is in the form of food. It is not practicable in many of the primitive conditions in which such fishing is prosecuted to assess the value of the catches nor is there any seemingly worthwhile need to do so. Opportunity cost perhaps weighs far more in determining the continuance of such fishing than in fishing which depends upon a profit element for its continued viability.

A commercial fishery is one in which persons or firms engage so as to provide, by monetary reward arising out of the sale of fish, a significant part of their livelihood. Full-time fishing need not be the only criterion of a commercial fishery for there are many areas where fishing is conventionally a part time occupation worked at in conjunction or in association with other kinds of employment, principally agriculture. Crofting, i. e., joint farming and fishing enterprises conducted by some communities in the remote areas of Scotland, provides a useful example. It is an essential condition of this concept of a commercial fishery enterprise that the fish be caught and sold, and these two functions of a primary enterprise cannot be separated one from the other. The physical task of carrying out the initial selling function may be delegated or appropriated to another who specializes in that field, but the cost of that function is directly borne by the primary enterprise.

Simplest form of enterprise

The most common means of catching fish is from a craft usually designed specifically, or capable of adaption, for the purpose. It is usually registrable as a craft, with specific means of identification, in the shipping register of the country of its flag, and conducts its fishing operations for the most part as a separate and quite independent unit of a fleet. In this sense a fleet is a convenient term to apply to a group of vessels engaged in some common purpose, but it does not necessarily imply in this context any common ownership, or direction, nor uniformity of size, style or appearance. If this condition were to exist universally, the concept and definition of a primary fishing enterprise would be a relatively straightforward matter, because ease of identity and independence of action (within general limits) suggest the individual fishing craft as the most convenient economic and accounting unit; and *there is much to be said in favor of regarding each vessel as an enterprise in conformity with a practice which obtains in*

many fishery countries today. But this is not the only form of prosecuting a fishery, although in some alternative kinds of fishery a convenient unit corresponding to that of the fishing boat can be easily identified, as, for example, in the use of a shore seine net. This method does not require the use of a boat but nevertheless there exists an enterprise associated with the use of a net, since that is the instrument by which the fish are caught, and the individual members combine jointly to operate it, and share the value of its contents. Where net traps are set in considerable number it may be more convenient to adopt a procedure of grouping the nets in order to determine the enterprise. The group may be made up of those nets worked by an individual, or by a group of individuals working as a team, or those nets set in a particular fishery and falling under common ownership. These are among the more primitive methods of fishing, although they are still practiced successfully in advanced and developed fisheries, notably river fisheries. Regard must therefore be paid to their existence and they must necessarily form part of the consideration of the concept of a fishery enterprise.

More complex enterprises

From those undertakings prosecuting a fishery without craft, one passes to those with more than one craft, i. e., where more than one craft is used for the hunting of fish or catching it or landing it on shore. The simplest development in this direction has been the use of two craft to tow a single trawl – pareja fishing, largely practiced by the Spaniards, is a good example. There is also the more complex depot or mothership technique by which one large ship acts as a depot to a number of smaller catching craft which deliver their catches to the mothership for processing and storing and conveying to land. New developments in some fishery countries suggest that the fleeting system of working a long-distance fishery may soon become a practical solution to the economic problems of the long-distance fisheries. By this method the first few hauls of a fishing craft after arrival at the grounds are not taken on board but transferred to other fishing craft on the point of returning to base port. Feasibility tests are being conducted in the United Kingdom but whatever the technical merits of such methods they are sure to create fresh problems in the analysis and treatment of accounting and economic data. The attempts may only be interim, or transitional, arrangements for the better economic use of the existing fleets and their effect on accounting techniques and economic con-

cepts may be shortlived. Nevertheless, they should not be omitted from any analysis of the present conceptual problems and those ways which are likely to offer satisfactory solutions should continue to be examined.

The most modern technique of prosecuting long distance fishing is by the use of a comprehensive factory trawler, catching, filleting, quick-freezing and packaging the fish at sea, besides carrying out manufacturing processes with offal, waste and trash fish. Progress in the fishing industry invariably brings with it a concentration of functions and as the minimum unit of fishing operation gets larger, so the nature of its products becomes more complex. These changes in fishing techniques and in the roles of those undertaking what used to be clearly separate and definable functions create problems of definition for these functions now merge one with another to create new enlarged integrated operating units. They can hardly be included in a definition of primary enterprises because they undertake certain of the secondary phases as well. The same, of course, is true of the more primitive fisheries, including salt-fish voyages where the fish are split and wet-salted at sea. In any case, where the degree of processing carried on at sea reaches such proportions as to make the landed product quite different from the natural state in which the fish was caught, the processing stage obviously absorbs such a large proportion of expense as to warrant separate analysis.

Division of functions

This condensed recital of the broad forms of fishery enterprise has not examined the kind of ownership, nor how entrepreneurial functions are exercised. The entrepreneur on board a fishing vessel working with others as his crew would normally exercise the legal function of a skipper, or vessel captain, in addition to the usual function of entrepreneur. His command in these circumstances is therefore complete and the responsibility for the success or failure of the enterprise as a business venture is his alone. It aids understanding of the fishery enterprise concept to accept this simple form as the primary fishery organization where entrepreneurial and managerial functions vest in the same individual and where, because of his presence on board, the hour-to-hour conduct of operations is under his detailed direction. The fact that the owner may not sail in the craft, or if he owns a number of vessels, sails only in one of them, does not make the enterprise unit any less readily identifiable, but it does create a problem of dealing with tasks which are performed for some purpose

common to a business undertaking of which the individual fishing vessel may represent only a small part. The exercise of certain entrepreneurial functions in these cases must inevitably fall on the person actually in command of the fishing unit and although co-operation between owner and skipper (or captain) may be very close, the fact that responsibility must perforce be divided tends to lessen effective control by the entrepreneur. A measure of safeguard is created by the conventional system of remunerating the skipper and crew by paying them either a share of the total value of the catch, or otherwise computing the sums due to them by reference to such value. These " joint ventures, " where the skipper and other crew members stand to share in the " profits " of a fishing voyage, lead to closer and more effective co-operation between owner, skipper and crew, since they each have a common purpose in maximizing their financial return and it is no doubt because they have succeeded in securing such co-operation that arrangements of this kind have persisted for so long. Joint ventures have other beneficial effects besides a simple increase in the monetary reward by securing the greatest possible catch, since the means adopted to improve the level of gross earnings may often include measures taken to secure an improvement in the quality of fish landed and improvements in fish quality may materially help to foster sales and improve prices. There may also be, and there often are, safeguards in the method of computing the shares payable to each factor, so as to take account of the usage (usually measured by reference to expenditure) of such items as fuel, fishing nets and general stores.

Problem of defining a fishery enterprise

The maximizing of proceeds and the minimization of costs are usually the most important aims of those engaged in a single enterprise. It might therefore be argued that *a fishery enterprise cannot consist of any unit smaller than the combination of those factors of production directly participating in the earnings of a boat or group of boats.* Thus, where two or more boats combine to secure a single catch, as, for example, with pair-fishing, or with some methods of tuna fishing, and the factors so employed are remunerated by reference to that catch, or its value, the enterprise consists of those boats so collectively engaged, even though parts of that catch may be taken on board separate vessels. This is clearly a departure from the basic concept that a fishing vessel is the primary enterprise and illus-

trates that the concept of an enterprise cannot be divorced from the nature and method of fishing pursued.

An enterprise cannot be determined by reference to either the amount of its capital or the source from which it is obtained, nor does it follow that the application of any particular subscription of capital is for the benefit of a single enterprise. The smaller the enterprise, the more difficulty there usually is in the provision of adequate capital. Larger undertakings frequently consist of "multiple enterprises" and capital needs tend to be met from the accretion of relatively small amounts from each, in some central fund, or else by subscription which does not always bind the hand of the entrepreneur to apply it to any one enterprise.

It is not uncommon in some fishing areas for the capital equipment to be provided from a variety of sources. The vessel, for example, may belong to a single shore owner, or to the crew as a partnership, or to certain members of the crew; the fishing gear may be provided by each crew member individually. There is part individual ownership and part collective ownership of the assets as a whole but participation is not necessarily in any standardized proportions, and, where the method of sharing the earnings of the vessel provides for the common pooling of the total proceeds of sale, the shares are distributed in such proportions as take account *inter alia* of the respective interests of each participant in the capital provided. The measurement of each person's contribution may be in terms of money but more often in physical units of measurement, such as the number of nets, lines, or hooks, or the number of shares in the vessel. Changes in the value of money therefore have no effect upon the proportion each participant secures from the joint venture.

With the progress of new types of organization in the fishing industry and the development of large-scale ownership by joint stock companies, a large measure of integration, both vertical and horizontal, becomes increasingly inevitable. As a result, the functions of catching, landing, processing and distributing can become so closely integrated that a primary enterprise can hardly be held to exist as an identifiable unit. So long as the primary and secondary phases are separated by a point of sale, with a physical transfer of the products landed identification of the primary enterprise is clearly much simpler. But even though that clear line of demarcation may be obliterated or obscured *the concept of a fishery enterprise should be related solely to the product of the primary phases including such elements of simple fish processing as are carried out on the vessel.* In addition to simple processing there will be certain other relat-

ed functions, such as icing and stowing in the fish hold, and subsequently, the unloading and weighing of fish on the quay. These are functions customarily inseparable from the primary enterprise. Similarly, the cost of selling the fish, including the services of salesmen and the use of containers and other equipment, are part and parcel of the conduct of an enterprise and it is neither desirable nor necessary for them to be regarded as the initial stages of a new phase. The secondary phase cannot properly be held to have commenced until after the sale of the products at the quayside, [1] or if no actual sale takes place, up to the point where the products pass out of the control of those directly engaged in the primary phase. Some difficulties obviously occur when unusual routines are followed, or in cases where the sale of fish takes place at some distance from the landing quay. But these are difficulties of analysis rather than of concept and definition. Accounting and costing principles must be applied to the organization of the enterprise as it exists and it is undesirable that alterations to procedure and techniques should be sought simply in pursuit of uniformity, or to follow a neat pattern of definition.

A fishery enterprise may therefore be defined [2] *as that combination of factors operating as a fishing unit, directly engaged in catching fish and bringing it to land; but where the amount of processing carried on at sea goes beyond those simple processes necessary to preserve quality and has the effect of materially altering the form, shape or appearance of the fish such enterprises should be called composite fishery enterprises, so recognizing the fact that the activity is not limited to the primary phase.* This definition of a fishery enterprise does not appear to be inconsistent with that followed in most of the leading fishery countries. It leaves investigators free to combine the operations of a fleet of vessels in a single enterprise, where they are engaged in fishing activity so closely integrated as to make identification of their respective contributions to earnings an impossibility; or conversely, to isolate individual vessels of a fleet operated by a single owner but where it is evident that each of such vessels is operated independently; or to regard as enterprises, individuals or groups of individuals not using vessels except in some ancillary sense, such as with trap or weir fisheries.

[1] In the case of factory trawlers and in some other cases where manufacturing processes are carried on at sea, this statement would not be technically correct.

[2] This definition has been expanded to take account of factory trawler activity.

2. CONCEPT OF A FISHERMAN

Definition of a fisherman

Fishermen may be defined as all persons other than sports-fishermen or absentee owners, bona fide engaged in the catching of fish and conveying them to land, including all seagoing personnel on fishing craft notwithstanding the nature of their duties while they are afloat. [3] This definition helps in understanding what a fisherman does, but it does not assist in the problem of manpower classification. Nevertheless, a definition is a helpful preliminary to classification.

Not all fishermen are engaged full-time at that occupation and a fisherman is not necessarily disqualified from being classified as such simply because the extent of his activity in a fishery is only part-time or occasional. Some useful recommendations were adopted at the FAO Experts Meeting on Fishery Statistics in the North Atlantic Area in Edinburgh, Scotland, in September 1959. Delegates agreed that a full-time fisherman was one who receives at least 90 percent of his livelihood from fishing or spends at least 90 percent of his working time fishing, a part-time fisherman between 30 and 90 percent and an occasional fisherman less than 30 percent. These proportions obviously refer to an annual period, for if they did not, the seasonal nature of some fishing activities would seriously distort manpower classifications. The classification of other than full-time fishermen creates certain difficulties. The fundamental differences between a part-time or occasional fishermen and a seasonal fishermen are outlined below.

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[3] This might, in some cases, include a number of persons engaged in secondary activities, and this is discussed further on. But there is some difficulty here in reconciling strict economic concepts with a recommendation on manpower statistics adopted at the FAO Expert Meeting on Fishery Statistics in the North Atlantic Area (Edinburgh, September 1959). Here, it is preferable to accept the broad definition recommended by the meeting for, although this does not command universal acceptance, it has a good deal of support.

Part-time and seasonal employment

A part-time fisherman (or an occasional fisherman, since the difference is mainly one of degree) may engage in fishing during part of his working day. For the rest of the working day, he may engage in some activity closely associated with fishing, such as the processing and retail selling of his products, or in some ancillary activity such as the use of his boat for pleasure trips, or as a public transport service. These " ancillary " activities may not necessarily detract from the vigor of his fishing, for the nature of his fishing method may perhaps necessitate long periods of waiting, such as when pots, baskets or traps are set and there is undoubted attraction in the profitable employment of time which would otherwise be enforced idleness. But not all part-time fishing activity bears this close connection with other forms of employment. Traditionally, many part-time fishermen engage in agriculture, particularly in remote coastal areas where fishing probably originated as a means of subsistence. Some of these predominantly subsistence fisheries still persist, even though their economic worth may be relatively low.

The seasonal fisherman, on the other hand, prosecutes a fishery intensively for only part of the year. His intensity of effort may well be greater over that limited period of time than his counterpart in a full-time fishery, because the presence of fish, which is normally the principal characteristic of seasonal fishing, demands that fishing shall be prosecuted with the utmost vigor. The pelagic fisheries of Western Europe provide good examples of this kind of fishing activity. For other periods of the year when fish are not present in commercially exploitable quantities or weather conditions and locale prevent fishing, these fishermen must turn to other forms of employment, which may also exhibit marked seasonal characteristics.

Full-time and part-time fishermen customarily keep within their own classification, i.e., they do not normally move from full-time to part-time or vice versa. It is important that the nature of the fishery and the extent to which fishermen prosecuting it are employed full- or part-time should be treated as an important element in the basic data of costs and earnings studies.

Nature of duties

Not all seagoing persons employed in fishing activities are themselves engaged in catching or handling fish. They may well be occupied in some task unassociated with the practice and art of fishing, such as engineer,

cook or wireless operator, but they form part of the fishing unit and their working makes the use of the craft an effective instrument for fishing. Their direct participation in the running of the vessel distinguishes them from shore-based personnel who help to keep the vessel in service. Others on board may, in the case of factory trawlers, " semifreeze " trawlers or salting trawlers, include personnel whose functions are limited solely to processing the catch. The work may include filleting or splitting, quick-freezing and packing. *Convention terms such personnel as fishermen and in conformity with international classification it seems quite proper that they should be so regarded.* There is nothing in the technique of conducting costs and earnings enquiries which requires them to be treated otherwise, but because of the effect of their labor on the operating costs of the fishing unit and on the quantity and value of fish landed it is very important to treat such units separately.

Shore personnel

Many fishermen come from closely knit communities where fishing is life and breath. The tradition of fishing is strong in their blood; regardless of the striking contrast between the sizes of the communities from which they spring, varying from small fishing hamlets, where fishing is just an alternative to the production of food on land, to large communities, where fishing represents just another activity in a highly industrialized and commercialized metropolis. The distinction between fishermen as defined in the opening paragraph of this chapter and working members of a fishing community must not be overlooked, and although costs and earnings studies might be a useful and indeed indispensable tool in examining socio-economic problems of fishing areas, such broader studies should not usurp the work of costs and earnings studies in the much more limited sphere of the fishery enterprise. The integration of fishing employment and employment in other food producing activities does not create problems which cannot be simply overcome by the use of proper methods of enquiry and interrogation. Although fishermen engaging in mixed employment cannot always be expected to record the details of the work they do, a general separation of their time is all that is normally required and this can usually be given from memory, particularly if custom and habit in the performance of certain tasks are a distinguishing feature.

Working owners

The term " fisherman, " as already defined, relates solely to the type of industrial activity in which an individual is engaged. It does not necessarily imply that a person engaged in a fishery enterprise is other than an employee, remunerated according to some accepted scale of payment. But he might be more than this and own the vessel, the gear and all the other assets attaching to the enterprise, either solely or in partnership with others. Statistically this distinction between fishermen who own and work their own vessels and those who are employed is not very significant but there are certain aspects which must not be disregarded. The theoretical definition of surplus (or profit), for example, may be a concept which the working owner fisherman does not comprehend. He will be interested to secure a cash surplus somewhat greater than he could receive were he employed and remunerated as an employee, but in reckoning that surplus he will not be very much disturbed, particularly if his craft is an inherited possession, by the thought that depreciation on his vessel is not being covered by adequate provision, nor by the fact that interest on capital employed, if charged, would put him " in the red. " His capital requirements will be met out of the accretion of surpluses. The enterprise will tend to remain relatively small, because expansion will generally be inhibited by an inability to accrue sufficient capital to acquire additional assets.

Trade associations and trade unions

Fishermen are invariably joined in some sort of association to protect and advance their individual interests. Those who are vessel owners will customarily be members of an association of vessel owners, and such association may be relatively loose. The fact that the members do consult one with another, with a view to maintaining or improving their position in the economy, is evidence enough that an association does exist and governments generally encourage the formation of such associations, because of the improved facilities they offer for consultation on matters affecting fisheries. Employees tend to combine by joining trade unions and their interests are not unnaturally focused upon the capacity of a fishery to pay reasonable rates of pay. Those engaged in work ashore are not normally classified as fishermen primarily because the nature of their work is quite distinct from fishing and is more properly classified along with some other trade for which a suitable classification already exists. Fish processing, for example,

is a branch of the food processing and manufacturing industry; net manufacture is clearly a product of the manilla industry; trawler building is a specialized branch of engineering, and so on. The relations of those engaged in these classes of employment with those in the primary enterprises must obviously be very close for their common livelihood depends on the success of the fishing; but, in spite of this, sectional interests are clearly evident in most countries and often the associations of persons among both the employing and employed classes are often directed more to the furtherance of sectional interests than to mutual advancement. The existence of any bias originating from this cause must be carefully noted.

3. ASSESSMENT OR EVALUATION OF GROSS EARNINGS

Sources of income

A fishing vessel, or other form of fishing enterprise where no vessel is employed, secures its income principally from the sales of fish, but there are other kinds of income associated with the use of the vessel or its gear, which it would be quite wrong to ignore. If it is questionable whether certain income is to be included it must first be determined how far such income is derived from the use of the vessel. And if such income is to be eliminated, any element of cost appearing in the operating statement which was incurred for the purpose of securing such income should similarly be eliminated. The sort of items which fishermen frequently exclude or sometimes ignore are the value of "stocker" [4] bonuses from fishing co-operatives, discount and allowances, salvage and towage money, or income from other nonfishing activities, and the profits of departments engaged in servicing and supplying victuals, stores and equipment to the fishing vessels. A definition of gross earnings in the fishing industry is, therefore, a difficult problem, and it does not appear to have been attempted in any published work. References to gross earnings at the Technical Meeting in London, from 8 to 13 September 1958, appeared to be over-simplification of a complex problem. In Denmark, gross profit (sic) is defined as "*the value of the total gross production of the enterprise emanating from the direct sale of the fish products, from products delivered to own household on board or ashore, or from products handed over as rent.*" [5] In Canadian studies the term "receipts" is adopted and receipts for freighting co-operative dividends and "other miscellaneous sources of revenue connected with

[4] Certain species or quantities of fish given to the crew as a perquisite without condition as to its disposal, a practice largely dying out.

[5] Paper by S.R. Sorensen, Ministry of Fisheries, Copenhagen, submitted to the London meeting in September, 1958.

the enterprise" are included. The Japanese approach is quite different in that it ascribes the total income accruing to fishing households to a number of sources, i.e., fishing, fish processing, farming and other activities, and then analyses in detail the costs and proceeds of the fishing activity alone. [6]

Definition of fishing income

It is clearly of the utmost importance to research workers to know to what extent gross fishing earnings in different countries, or drawn from different sources, are capable of ready comparison, one with another, and to know what other types of incomes, if any, accrue concurrently to the enterprise. A suggested definition of gross fishing earnings is therefore given as " *the gross income derived from the sale at first hand of fish* (*including marine animals*), *fish products and fish waste, including the full amount of such additional income as may be received by way of bonus or other deferred payment.* " In costs and earnings statements the term " gross fishing earnings " should be used in preference to imprecise terms such as " value of catch. " Where the crew consumption of fish or the quantities of fish given to the crew for their own use are significant, imputed values can be included with earnings, but they should preferably be separately distinguished and counter-entries will need to be made on the costs side. It is because of the counter effect of these entries that, unless the amounts are significant, it is as well to leave them out altogether and this seems to be in keeping with the established practice in most fishery countries. The type of study, and the class of fishermen it covers, will determine how far it is necessary to itemize fishing earnings by species of fish, but it would clearly be desirable in a study of the earnings of herring fishing or salmon or halibut fishing to single out at least those principal species or classifications of species so as to indicate the contribution they make to earnings. This is already done in the studies carried out by the Department of Fisheries of Canada in their salmon fishery surveys and by the White Fish Authority (United Kingdom) in their unpublished studies of coastal fisheries.

Treatment of nonfishing income

Discount and allowances received and insurance settlements for damage are not properly income at all and are really rebates of expenditure. Such

[6] " Method of Enforcement of Costs and Earnings of Fisheries Industries in Japan." Paper submitted by the Ministry of Agriculture and Forestry, Tokyo, to the London meeting in September, 1958.

items should not be included under the heading of earnings, but used to nett down the costs of the items involved. Insurance settlements for damage should be used in reduction of the cost item in which the expenditure, usually repairs, is included. It should not be used as an offset of insurance premiums.

The receipt of moneys from an insurance company for demurrage or for some specific services performed or receipts for some incidental activity rank as income, and although they may be aggregated under one heading and called " other income, " it is useful in many cases to give some indication of what those moneys represent. They may be sporadic, such as payments for towage or salvage, or they may be more regular and consist of sums received for private hire or freightage. The decision as to whether or not an item is to be included as an item of income must rest on the extent to which that item could reasonably form part of the income of the fishery enterprise. If the income arises from use of the vessel or vessels engaged in the enterprise, there is compelling reason for including it as income. Payments made to fishermen under state social security schemes, on the other hand, should not be included. The description of sums so received may vary from country to country but they will normally be paid from public sources in respect of periods of sickness, incapacity following injury sustained during the course of employment, or during periods when employment is not available.

It has been presumed that in most instances income is not realized unless a sale of fish takes place, the proceeds of which can be used to determine gross fishing earnings. This is, of course, not always so. If there is no sale, but simply a transfer of fish from vessel to shore establishment, earnings can be calculated at values used internally for cost accounting purposes; or those figures can be considered as earnings which are used for calculating remuneration due to the fishing crew, provided they are realistic assessments of what the fish would fetch on the open market. If neither of these methods are practicable alternatives, earnings can only be imputed after consultation with the fishermen and owners concerned.

Analysis

Ideally, statements of gross fishing earnings should indicate the four factors principally determining the value of earnings.

1. quantity of each species landed, preferably by reference to a unit of weight;

2. method of sale;

3. end use;

4. prices received.

But an analysis of this kind may not always be possible and it may be necessary to decide which sale classification criteria are essential for the purpose of the study and those which are largely esoteric. End use, or disposition of catch, however, is of great importance and costs and earnings studies should wherever possible give some indication of the use to which the fish is put after sale. Where this is uniform as, for example, for vessels fishing solely for canners, or for pet food manufacturers, this is purely descriptive, but in fisheries serving mixed bodies of buyers the problem is of consequence for analytical purposes. Sometimes the end use is only determined by the buyer after purchase and sorting, and in those cases consultation with the processors may be necessary.

The method of selling fish, including the operation and administration of minimum price schemes, obviously influences the average returns secured by fishermen and selling prices will differ as between different classes of buyer. Fish destined for the fresh fish market may well be purchased at port auction markets. As regards fish to be used in manufacture, especially where there is heavy investment in fish processing plants, the processors will seek to ensure relative continuity of supplies and stability of prices by entering into buying contracts. Surpluses of fish may be taken up by manure or fish meal manufacturers at any price the buyer cares to offer, simply in order to remove unwanted fish from the market, and the return secured in that way, including any deferred payment, will invariably be below the average cost of production. The existence of a minimum price structure will make the creation of surpluses more likely but, from time to time, surpluses will appear and prices slump whether or not a minimum price scheme is in operation. The unwanted products of sports-fisheries, such as the sharks of southwest England, do not assume any economic importance in this context.

Noncapital subsidy receipts

Fisheries in some countries receive government subsidies. The form in which these are paid may vary and, even in the same country, different forms of subsidy payment may be applied to the several fisheries. Where they are paid as a straightforward addition to earnings no problem arises,

for such additions clearly form part of earnings and should be included as such, though separately distinguished. In other cases, e.g., government-supported producers' prices, the underwriting of processing losses or the provision of subsidized or duty free commodities, the subsidy paid to sectors is less easily identified and, as a rule, need not be taken into account. Such forms of government assistance are better dealt with in relation to the fishing sector as a whole rather than by attempting to apportion them to individual enterprises.

4. COST OF SUPPLIES AND SERVICES

Cost and expense

" Cost " in accounting parlance means " the amount of expenditure incurred on a given thing " and has been defined as such in an authoritative British publication. [7] Expense on the other hand has a quite separate connotation, and describes that third element of cost which combines with direct wages and direct materials to produce total cost. *Expense is defined as " the cost of services provided to an undertaking and the notional cost of the use of owned assets. "* [8] This clear distinction between cost and expense has been accepted not only in the United Kingdom, but in the United States [9] where the term " expense " is more commonly described as " burden. " These definitions do not distinguish clearly between expenditure on the acquisition of fixed or " lasting " assets, i.e., assets, such as vessels and machinery, and expenditure incurred on operating and maintaining them. [10] It is important, however, that such a distinction should be drawn.

Revenue and capital expenditure

There is no finally exhausitive test for determining whether expenditure is of a capital nature or not but in a court judgment in 1925, [11] Lord Cave said that expenditure was not revenue expenditure if it had been made " with a view to bringing into existence an asset or an advantage with an enduring benefit. " This, though not a positive definition, is a useful test

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[7] *Terminology of Cost Accountancy*, Institute of Cost and Works Accountants, London, 1952, p. 10.
[8] *Ibid* p. 11.
[9] *See* Lang. *The Cost Accountant's Handbook*, Ronald Press, 1947, and other authorities.
[10] Usually known as " revenue " expenditure.
[11] Atherton *v.* British Insulated Cables (1925); 10 T. C. 155.

which can be applied to expenditure by, or on behalf of, fishery enterprises as indeed it can be applied to the expenditure by any undertaking. There is no doubt that expenditure on a fishing vessel with its engine, echo sounder, fish finder, winch and fishing gear, wholly constitutes expenditure of a capital nature because it provides the medium for earning revenue and is of enduring benefit. The means by which such expenditure is "recovered" in revenue or operating expenditure may vary; it may not necessarily be on the basis of depreciation, [12] although that will be the generally accepted method for the vessel, the engine and any durable equipment. The fishing gear is more likely to be treated as expendable and all purchases of gear other than the initial fitting out regarded as replacements of gear and entered as operating expenditure accordingly. This procedure for the treatment of gear expenditure seems to be in fairly general use and where it is not its adoption is recommended. It may need to be modified slightly where stocks of gear and equipment at the beginning and end of account periods are subject to significant change so as to adjust the operating expenditure to take account of rises or falls in gear inventories.

Operating expenditure

Expenditure which is not capital expenditure should be termed "operating expenditure" and should include all expenditure by the enterprise whether paid for by the owner or the crew, and it is with this class of expenditure that the remainder of this chapter is principally concerned.

In costs and earnings studies in the fishing industry there has not been, so far, any attempt to standardize terms between professions and this may be because fishery costings studies have mostly been initiated and conducted by professional economists. Precise accounting terms have not been introduced to fishery economics nor have any of the techniques of costing or management accounting as generally applied in industrial undertakings. Consequently, the nomenclature used has been principally that to which economists are accustomed. Professor Osterbind has said that "to the extent that inputs are detailed, accounting terminology and conventions should be recognized." [13] This concept of harmony, however cogently argued, may prove difficult to institute in practice. Not all economists

[12] In any particular year, of course, depreciation is a noncash expenditure, but nevertheless an important item of cost.

[13] Paper prepared for the Technical Meeting on Costs and Earnings of Fishing Enterprises, London, September 1958.

would be prepared to concede that the word " expenses " should be equated with " burden; " or that a distinction need be drawn between variable costs (those varying with output) and those which are static or substantially so; or that conventional forms of costs and earnings statements are outmoded in the light of present day accounting and cost control techniques. These are matters deserving of serious consideration not only for the benefit of fishermen but for the professions as well, for the closer accountants, economists and statisticians can come to use agreed nomenclature, the greater the facility with which data can be collected, analyzed, compared and understood. For the present, however, nomenclature should not be drastically revised. The continuance of the *ad hoc* nomenclature which has developed in fisheries over the last decade or two appears generally well adapted and the first step might well be to secure general agreement between the professions on uniformity of application. The use of a more developed inter-professional nomenclature can then follow.

Analysis

The accepted procedure for the analysis of items of cost in contemporary studies is to follow the general pattern of cost breakdown customary in the industry itself. It is not unusual to find considerable similarities in the cost analyses of different countries. This feature can be attributed, at least partly, to the method used for determining allocation of earnings as between the different parties to the venture and the influence of management and workers in securing the sort of information they require to safeguard their respective interests and the relative importance of each cost item, which dictates to management and research workers alike the sort of cost breakdown which will throw the important items into relief. The grouping of all operating costs, or a large proportion of them, under a single head fails to demonstrate the relative importance of each constituent item of cost or to provide data which can be usefully compared with previous studies or studies carried out by others. Wherever possible, therefore, a cost breakdown should be considered a necessity. The Department of Fisheries of Canada, in its Primary Industry Studies, has done much useful work in publicizing the types of cost analysis it has developed.

Where the enterprise is centered round a fishing vessel, the first broad group of expenditure relates to those costs incurred in " running " the vessel, but not the cost of wages, which is considered, in detail, in a later

chapter.[14] This group will include fuel for propulsion, lubricants, ice, bait, fish boxes or barrels, food for the crew and general stores for cleaning, etc. Of these, the largest single item is likely to be fuel oil. The second group will represent those items related primarily to "maintenance of capital" and to a lesser extent to the operation of the vessel, such as repairs to the hull and fittings of the vessel, to the engine, to the renewal of catching gear and to the servicing of fishing aids and navigational equipment. Thirdly, there will be the cost of providing shore facilities for the landing and selling of fish, and the cost of an administrative organization for running the enterprise (which might be a single vessel, a fleet of vessels under one owner or a large group of vessels administered by an agent on behalf of a number of owners).

A tabular arrangement of the costs of supplies and services for a fishing unit might, therefore, be constructed as follows:

Running costs

Fuel oil (or coal) and lubricants
Ice
Hire charges for equipment
Boxes, baskets, etc.
Bait
Food
General seagoing stores and sundries

Maintenance and repairs

Repairs to hull
Repairs to main engine
Repairs to other machinery
Repairs and upkeep of catching gear
Repairs and servicing of fishing aids and navigational equipment

Shore costs

Wharfage and dock rentals
Baiting (when carried out by hired shore labor)
Unloading labor
Fish selling
Marine insurance
Administrative expenses

[14] Chapter 5.

The assembling of data relating to these various expenditures will not, in every case, be as straightforward as this simple analysis suggests. But the desirable feature of any costs and earnings analysis should be to enter direct to each unit the actual costs of the supplies and services which that unit has utilized or absorbed, and to illustrate, by suitable grouping, the incidence of running costs, repair and maintenance costs and shore costs. There is no necessity to correlate these groups of cost expenditures with the remuneration of the crews but, when the method of calculating the amounts due to the crews is dependent upon the deduction of amounts expended on certain classes of costs, it is useful to see by inspection how movements in the sums paid to the crews have been influenced by changes in the incidence of those costs.

Departmental costs

The more advanced and highly integrated the fishery enterprise, the more likely it is that problems will arise in the matter of definition, particularly in relation to the costs of supplies and services provided by departments ancillary to the fishing industry, but so closely integrated by ownership and control as to form a part of it. Some of these enterprises, operating ancillary services either departmentally or under a separate incorporated company, make changes to the fishing units at cost, excluding any profit element, it being assumed that, as the fishing fleet is the *raison d'être* for the whole enterprise, the financial outlay should be wholly expressed as input to the fishing units. Other enterprises with closely parallel organization regard each ancillary activity as an operating department and raise charges on a cost plus basis, retaining the resultant profit in the accounts as a profit on ancillary activities. The problem thus presented is further complicated by the profit on goods sold to, and the work done for, " outsiders " which, of course, is business secured competitively and charged for in accordance with normal commercial practice; and also by the receipt of bonuses, rebates and concessions arising out of investments, most of them minor, in collectively owned organizations or trading co-operatives.

It is not easy in the absence of a generally agreed policy on valuation for input purposes to know what particular method has been employed in each country. *It is recommended, therefore, that inputs in all cases should be valued at cost and cost should not be calculated so as to include any notional element.* If the departmental accounting system in use and the method of raising departmental charges results in an operating surplus on

the departmental accounts, such surplus should be allocated in the form of a rebate calculated in the proportions in which the respective inputs have been charged to the consuming units. In some cases, part of the departmental surplus will relate to outside interests and it is desirable that this part of the surplus should be retained as an item in the accounts and described as profit earned on work done for outside interests. It should not be allocated to vessels, but the nature of some economic enquiries may, of course, necessitate that it be taken into account. *Where mutually- or co-operatively-owned service establishments distribute their surpluses as a bonus or "dividend," these sums should be allocated to fishing units and utilized to reduce costs. The inclusion of such sums as earnings is not recommended.*

Indirect subsidies

In some countries relief is given to industry by way of lower rates of commodity tax or by preferential scales for municipal taxation. The task of isolating such benefits is formidable and in many instances well-nigh impossible. While it is desirable that such benefits should be noted, no attempt should be made to evaluate those benefits on a fishery enterprise basis. It has already been mentioned [15] that certain forms of subsidy are better dealt with on a sector basis.

Expense allocation

The provision of certain common services for a fleet of fishing vessels will raise problems of expense allocation. As a useful pamphlet [16] issued by the Council of the Institute of Chartered Accountants in England and Wales points out, "the method by which such allocation is carried out in practice must depend upon the circumstances of each individual business." Fundamentally, however, there must be a primary allocation to functions and a secondary allocation to cost centers or units. The provision of a fish-selling service for a group of vessels is a good example. This service will involve expenditure on wages and salaries, stationery, office accommodation, electricity, and a number of other costs, all of which will need to be accumulated and aggregated before the total cost of the fish-

[15] *See* p. 21.

[16] *Notes on the Allocation of Expense*, Institute of Chartered Accountants in England and Wales, 1951, p. 5.

selling function is known. This first step is called the primary allocation. The total cost of the function must be distributed to fishing units, which is the secondary allocation.

The simplest method of allocating expense to producing units is by allocating an equal sum to each unit, but this simple method obviously takes no account of differences in size of vessel or to what might be quite substantial differences in the benefits received or the use made of any particular service. More refined methods have been developed and different methods are often used for distributing the cost of each function. It might be equitable, for example, to distribute fish-selling costs on the basis of quantity of fish sold; [17] refuelling costs on the basis of fuel bunkered; watching costs on the number of days in port. These are some of the more usual instances. The principle applied must be to make the charge conform as far as possible to the degree of benefit received in respect of that particular function. It is often useful to include in the footnotes to costs and earnings data the basis used for allocation of the principal items of distributable expenditure. *The allocation of expenses to idle units, i. e., those not participating in producing activities for a substantial part of the period, should be avoided as far as possible.* Such allocations to unused capacity are both wasteful and misleading.

Miscellaneous

The results of most costs and earnings studies, as the descriptive title implies, are expressed in monetary terms, and this must continue to be an essential feature. It is usually an easy matter to obtain data on physical consumption of fuel usage and such additional data can provide valuable comparative information.

The employment of shore labor, which may, of course, lose its identity as a labor cost by absorption in a functional cost, should be charged as a service item, and not classified with the wages or share money payable to the fishing crew. [18] The latter should be kept quite distinct.

The remuneration of directors, partners, etc., is within their own control and care must be exercised to see that where charges are entered for this

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[17] Agreement on allocating selling expenses in this way is far from general. The selling of a given quantity of fish tends, within limits, to be the same whether it is a high-priced or low-priced fish and quantity, therefore, measures the cost more equitably than value. Use of the alternative method of distributing selling expenses on the basis of value means that cost is allocated according to ability to pay.

[18] *See* p. 31.

class of personnel they are bona fide rewards for work done and are reasonable having regard to the work they do. No sum should be included which is more properly an appropriation of profit.

Costs incurred by the crew members themselves, as, for example, where they provide and maintain their own gear, cannot easily be incorporated in the information provided by the owner. The total sums paid to the crews concerned are shown in the settlement statements as remuneration and unless carefully watched can erroneously appear in costs and earnings statements as such. The fact that these personnel are required to meet certain classes of expenditure themselves does not abrogate the basic principle that all expenditures must be charged to the enterprise [19] and it may be necessary therefore to make estimates of the amount of expenditure so incurred if documentary records are not available. Notional assessments agreed with the Inland Revenue for taxing purposes can sometimes be obtained, but there is often a tendency toward overstatement of the amounts expended.

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[19] *See* p. 23.

5. REMUNERATION OF THE CREW

Definition and type of remuneration

Remuneration of the crew may be defined as " the sum of payments made in respect of employment as members of fishing crews. " The sum paid may be made up of a number of elements depending upon the form of the agreement subsisting between the crewmen and the owner of the enterprise. In the more usual forms the remuneration may be a share of the total catch; a share of the proceeds of the catch after certain running expenses have been deducted; a standing wage plus a proportion of the value of the catch; or, as on a number of factory trawlers, a basic wage plus a " piece rate " calculated on the physical output of the fishing voyage.

The " sharing " or " settling " agreement will necessarily have regard to the number of personnel normally engaged in a crew and the agreement may provide for variations in the proportions accruing to crew and to owner to take account of changes in the crew strength. On the larger vessels the standard number of crew is usually set out in the form of an establishment agreed with the trade unions and commonly conforming to a minimum establishment required by law.

The same crew manning the same vessel may be subject at different times of the year to " settling " agreements of a quite different nature depending upon the season or the type of fishing prosecuted, but this in itself need not create any difficulty in data collection or allocation to cost items.

Social security premiums

Social security premiums are, in many countries, met by contributions from both employer and employee, and where this practice obtains, from a purely accounting point of view, the cost to the enterprise is only that portion met out of the entrepreneurs' revenues. That part met by the

employee is part of his wage (or earnings) since he is under a statutory obligation to provide his contribution out of earnings. *It has become usual to include the whole of the social security premium with remuneration notwithstanding that that part of the premium is purely the liability of the employer, and it is recommended that this procedure should be generally adopted.*

Noncash element of wages

Where food or perquisites involving some specific outlay by the owner form, by agreement, part of the crew's remuneration, such outlay should nevertheless be recorded as food, etc., and not as remuneration. In assessing the total reward to the crew it may need to be taken into account as "value of wages in kind."

Total reward to labor is seen, therefore, to consist of three elements, i.e., cash wages, social security premiums and wages in kind, and the nature of the study and its objectives may necessitate these three elements being separately distinguished. *Where the cost item is referred to as crews' remuneration, without qualification, it should be understood to mean the sum total only of cash wages and national insurance premiums.*

Shore work

Basically, remuneration represents the reward for fishing effort, but not all the effort may be expended afloat, or in the case of shore fisheries, in fishing activity. Seagoing personnel may be remunerated for work done ashore, the nature of which may be quite distinct from fishing yet still be within the fishery enterprise. In considering these different types of work undertaken it may be as well to see how far they can be separately identified and whether there is any value or justification in seeking to classify them separately in costing studies.

The most usual kinds of shore employment are cleaning and repairs to the vessel, victualing and bunkering with stores and fuel, unloading fish on to the quay, mending nets, sorting and baiting lines and perhaps part-time employment in shore-based processing works. These tasks may be undertaken with regularity as part of the normal working arrangements of the enterprise, or they may be occasional, when, for example, no fishing is available and the crew are given the task of painting the hull. Much will depend upon the extent of the shore work and the arrangement with

the owner as to the method of remunerating it. If it is remunerated separately on a time or piece-work basis, then clearly there will be some record of the amount of the costs incurred in carrying out these tasks and it would be possible to allocate such sums to the appropriate cost headings. If, on the other hand, the sharing arrangements do not specifically take account of certain shore work without further remuneration, records are not likely to exist, and, if they did, there would be considerable difficulty in determining what proportion of total remuneration should be so allocated. Allocation on a straightforward basis of time worked would clearly be inequitable since it would imply parity of the value of fishing effort at sea with work on shore and this is generally not so.

There is no ideal method by which all the difficulties can be overcome. Uniformity in practice, therefore, should be limited to include, as crews' remuneration, all the labor share assessed under the sharing or wage agreement, provided that share is assessed in relation to the catch, notwithstanding that some of the duties carried out are actually undertaken on shore, for the location does not seem to be very material. It matters little whether baiting is carried out by the crew on land before the voyage starts or on board while the vessel is en route to the fishing grounds.

Where payment is made separately strictly on a time or piecework basis, or persons other than the fishing crew are employed, such disbursements should preferably be charged functionally and not included with share remuneration.

No one form of investigation can serve the several purposes for which costs and earnings data are required and this must be more clearly evident in the case of crews' remuneration than for any other item. If data on the earnings of different classes of rating are required, or the earnings from prosecuting a particular fishery defined either by species or geographical location are to be determined, some suitable record of crew payments will be necessary, since on analysis this sort of data will be found to add considerably to the study results. The use of simple or weighted averages to cover the earnings of personnel receiving remuneration on widely different scales can be very misleading and the true picture cannot be satisfactorily conveyed except by some attempt at rating analysis. This observation cannot apply, of course, where, for distribution of shares, all members of the crew rank equally.

Continuity and regularity of fishing employment may be factors influencing the average rate of remuneration and, if they have a significant influence,

this should be noted in the study appraisal. The employment of juveniles receiving shares of less than the standard rate for adult fishermen should similarly be noted.

Working owners

In most fisheries a substantial proportion of the enterprises are owned and directed by " working owners, " i.e., persons who work in the sense that they take an active part in fishing operations and often, though not always, qualify to receive a share as ordinary working members of the crew. Their share may, however, be a larger one because the work they do is superior in status, e. g., they may carry out the function of captain or mate; and additionally, of course, they will receive the surplus arising out of the operation of the enterprise. There may be more than one working owner per enterprise and this will mean that the partnership agreement, written, oral or implied, must provide for the scale of remuneration payable to each. It is important that, in order to preserve comparability between enterprises, the allocation of share money, or the total of the crews'remuneration should include a sum in respect of the working owner's services rendered to the enterprise in a fishing capacity, and this rule should be followed even where the only persons employed are working owners. *Sums paid to working owners, whose working contribution is administrative or clerical, should not be included with the crews' remuneration, but should be functionally charged as shore expenses.* To many fishermen this distinction, firstly, between payment as a reward for services and profit and, secondly, between different kinds of work, must seem an unnecessary academic exercise, but on examination the need for it is quite clear. To omit to do it would result in a serious disturbance to the comparability of neighboring enterprises and be a source of confusion to those engaged in the appraisal of cost and earnings analyses.

6. RENT

Land rent in the sense it is used in economic theory does not figure largely in the fishing industry.[20] In China, where fish farming is quite extensive and important, the concept of economic rent could probably be applied to such enterprises. No doubt a differential profit emerges from the better fish farms and there would also be " no rent " or marginal fish farms. But, on the whole, rent is not a significant cost element in world fisheries. Charges are made for fishing rights, and charges made for the use of the foreshore but, in commercial sea and lake fishing, even such charges are comparatively rare. They are much more common in sport-fisheries, e. g., the salmon fisheries of Scotland. *Where rent charges occur, they are properly chargeable as operating expenditure* and this applies also to the rent payable for shore properties used for the primary enterprise, such as storehouses and administrative offices. *If the property is owned by the entrepreneur and no rent therefore paid, it is a perfectly proper procedure to include as rent, and charge against operating expenditure, the net annual value of the property as assessed for tax purposes.*

[20] In some countries charges for the hire of boats and gear are described as rentals.

7. DEPRECIATION

Definition

The nature of depreciation [21] and the techniques employed to make provision for it are not generally appreciated for it is clear that there is a surprising lack of unanimity of views among the professions and no positive attempt has yet been made to co-ordinate ideas and formulate a policy which everyone accepts. Consider the following: *depreciation is the permanent and continuing diminution in the quality, quantity or value of an asset. The purchase of an asset, generally, is nothing more than a payment in advance for an expense.* [22] This is in keeping with another definition which describes depreciation as " the periodic allocation to operating expenses of the cost of physical assets over their economic life. " [23] In principle, of course, all assets having a physical life covering more than one year can be considered as capital assets. It is unusual, however, to charge to capital account many items of sundry expenditure, such as hand-tools and durables of small value and these are commonly treated as current expense items and charged with operating expenditure in the period in which the expenditure is incurred. [24] The subject of depreciation in relation to fishery enterprises is, therefore, principally concerned with fishing vessels and the major items of related durable equipment.

Methods of provision

There are some half dozen different methods by which the amount of given capital outlay can be spread over the operating expenditures relating to a number of years, but of these only two, i.e., the fixed instalment or

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[21] In any particular year, of course, depreciation is a noncash expenditure, but nevertheless an important item of cost.

[22] Pickles and Dunkerley, *Accountancy*, Pitman & Sons, London, p. 177.

[23] United Nations Statistical Office, *Concepts and Definitions of Capital Formation*, Studies in Methods Series F. No. 3, p. 15.

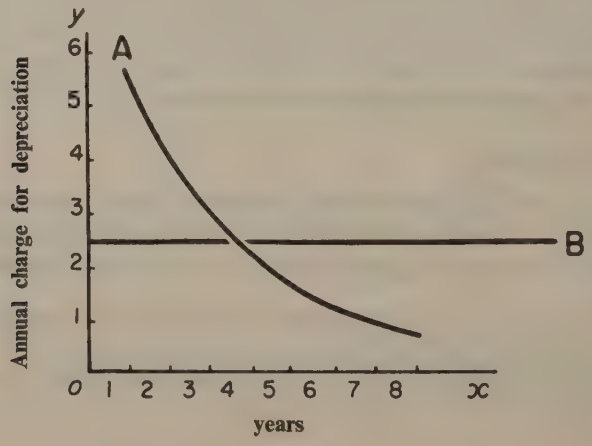
[24] *See* p. 22.

straight line method and the diminishing balance method, are in anything like extensive use. Both of these methods require the fixing of an economic or useful life for the particular asset and an assessment in advance of an estimated scrap or residual value at the end of that life.

Under the fixed instalment or straight line method the annual provision for depreciation is $d = \frac{a - b}{n}$ where a is the cost, b the residual value and n the estimated useful years of life. It is argued that the chief defect of this method is that the depreciation charge takes no account of the diminution in value which occurs immediately an asset is taken into use, nor does it bear any relation to the scale of repairs which is likely to entail only light expenditure at the beginning, but tending to become heavy in later years. For this reason the diminishing balance method provides some sort of compromise because it is applied by deducting from the cost a given percentage and calculating the percentage in the second and subsequent years on the " written down value, " i.e., the cost, less depreciation provided in earlier years. Each annual charge for depreciation is thus a term in a geometrical progression. The common ratio of the progression is calculated from the formula

$$r = 1 - \sqrt[n]{\frac{b}{a}}$$

where n is the years of useful life, b residual value and a the cost. The curves of the amounts charged annually under the fixed instalment and diminishing balance methods are shown below.



The curve in the diminishing balance method (*A*) approaches *ox*, but never touches it. The ordinate *ox* is therefore an asymptote to the curve and illustrates that this method has the added advantage that the asset is never written off completely – it always has some value in the books. Each method naturally has its proponents, but *the balance of favor seems to fall on the side of the straight line method* (*B*) *and it is suggested that this should be adopted as the norm for all fishery investigations.*

Practices in various countries

In fishery enterprise studies there are several different practices, according to the country concerned. In Canada, a straight line method is used and is calculated simply by dividing the total anticipated depreciation (wear, tear and obsolescence) by the number of years the asset is expected to last. For Canadian tax purposes a straight line charge of 7½ percent of the initial capital cost, plus additions, is allowed, or a diminishing balance method up to a rate not exceeding 15 percent; but there are a number of concessions which modify these rules where it is to the fisherman's advantage to do so. Two important features of the Canadian tax arrangements are that the choice of depreciation method rests with the fisherman and from the capital cost is excluded the amount of any grant assistance received from the federal or provincial authorities. For costing studies in the United Kingdom a straight line rate of 6½ percent of insured value is used, but for tax purposes an election between a straight line rate of 6¼ percent and a diminishing balance rate of 15 percent. A new approach has been attempted by Denmark where different straight line rates are used for the various constituent parts of the total asset, i.e., the hull, the machinery and the radio equipment. Percentage rates of 3, 10 and 15 giving write-off periods of 33 years, 10 years and 7 years, respectively, have been used in recent investigations. The standard depreciation procedure in Norway has regard principally to tax rules and this also appears to be common practice in Turkey. The Norwegian authorities are understood to favor the calculation of depreciation on replacement cost, one of the few countries where that policy has been accepted. The tax laws in a number of countries permit accelerated depreciation in the first year or two following the outlay. This practice seems to obtain in Belgium, Germany and the United Kingdom, but it is not so much a reflection of changes in asset value as an instrument to encourage investment. This is further illustrated by the United Kingdom " investment allowance, " a tax relief

which, together with an annual wear and tear allowance, enables a business to claim relief amounting over the life of the asset to 120 percent of the outlay excluding the amount of any government grant. Tax law on depreciation appears in general to set the standards which have been adopted in fishery investigations, but these standards are not necessarily the best that could be devised.

Effect of changing price levels

The methods cited provide, in most cases, a means of spreading a simple monetary outlay over a number of years of useful life. It is usual to add to the initial capital outlay subsequent expenditure by way of additions and these additions rank for depreciation along with the "parent" asset. But the basic problem attaching to depreciation in periods of changing price levels is to reconcile the definitions given with the need to preserve the assets value of an enterprise. It is a question, therefore, as to whether the total sums set aside for depreciation are to do anything more than amortize the initial monetary outlay. Some will argue that the purpose of depreciation is to preserve intact the real wealth initially contained in a capital asset and that amortization of a single monetary outlay does not do that in times of rising prices. It is true that it does not, because the sums which are being set aside are gradually being eroded by a depreciating currency and the cost of replacing the capital asset (assuming it would be a pure replacement and discounting, therefore, any added cost due to improvement in design, changes in capacity, in style or pattern, etc.) is itself rising. If prices continue to rise then, even assuming the replacement cost is used as the value for calculation of depreciation, there will always be a backlog of depreciation by which the total provision set aside will fall short of the sum necessary to effect replacement. This backlog can be counteracted by making transfers to reserves created for that purpose, but these are simply appropriations out of profits and not charges against profits, therefore they do not really rank for inclusion in operating expenditures.

A useful suggestion has been made by a Canadian accountant [25] to fund replacement provisions by investment in equity shares, the value of which will tend to follow the inflationary or deflationary trend of the economy. The same result could be achieved by investment in any commodity not

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[25] R. V. Benstead of Montreal. *See* letter to *Cost Accountant*, July 1960. ICWA London p. 271-72.

markedly subject to physical or price depreciation – gold in a free market, for example. This suggested procedure means that provisions regarding depreciation need to be calculated on a replacement cost assessment made at the time the provisions are made. The value of the funding investment will eliminate the backlog effect; it will not cure the problem of a constant revaluation of assets for purposes of calculating provisions.

The tax relief given by way of depreciation allowances, and the depreciation element entering into product costs, inevitably differ because they are assessed for different purposes, and the political considerations attaching to determinations for tax purposes are clearly inapplicable to those determined for costing purposes. It is wrong, therefore, to adhere to tax scales of depreciation allowances if financial prudency suggests otherwise. No particular rates can be laid down for much will depend upon the class of vessel, the kind of fishing it carries out, the materials of which it is made and the standard of maintenance normally adopted, but a suggested scale of rates applicable to various classes of vessel and equipment is given at the end of this chapter.

Asset value for depreciation purposes

The value which should be used for calculating depreciation should normally be the initial cost, and cost for this purpose should mean the total sum paid to the vessel builders including any sums provided under financial aid schemes whether by way of grant or loan. If only the nett sum after deduction of aid were used, this would mean that the total provision made at the end of the useful life would be less than that necessary to effect replacement; [26] it would certainly not spread over the period of useful life the " utility " consumed, but only that portion of the " utility " provided by the entrepreneur. It is as wrong to distinguish between the private and public sources of capital in a new vessel acquisition (or improvement) as it would be to argue that a new vessel was provided free if it were a replacement arising out of an insured total loss.

Separate asset accounts are sometimes kept for hull and machinery and they are each separately valued and depreciated. In the event of re-

[26] The exclusion of grant assistance from the depreciation base suggests that entrepreneurs need only provide up to the amount of their own outlay, including loans made to them, and implies the indefinite continuance of grant schemes. But most grant schemes are limited in time and, in any case, exclusion of grant assistances vitiates comparison of profitability between vessels receiving grant and those which are not.

placement of an engine, for example, the new engine is automatically capitalized and depreciated afresh from a new base. The advent of motor vessels has shown quite clearly that a vessel may be fitted with two or three new engines during its lifetime and, as the engine may amount to as much as 30 percent of the total cost of the complete vessel, separate depreciation rules are advantageous. *This procedure is considered desirable for all powered vessels and it is suggested that it be adopted in countries where it has not so far been followed.*

Costs and earnings studies in fisheries have developed mainly since the end of the war. Many fishing vessels in use, however, are of prewar construction and the cost of their acquisition and subsequent expenditure of a capital nature are either not available or appear, nowadays, to be quite unreal in monetary terms. The problem arises of how assets of this kind should be valued for depreciation purposes. It is particularly complicated in those cases where a sale has taken place within the postwar period and a vessel bought new for £1,000 in 1938, for instance, is selling for £3,000 in 1958. In the hands of the new owner £3,000 is the value for insurance and depreciation purposes, and indeed, this conforms with the definition of what expenditure depreciation is designed to amortize.

The problem has been overcome in a number of countries by valuing the vessel at its current insured value (this being regarded as roughly equivalent to a present-day valuation) or the value at which the vessel last changed hands, whichever value is the higher. This may mean that one vessel retained in the same ownership for a lengthy period would be completely written off in the books, whereas another vessel perhaps of the same age would have a substantial book value because of a recent sale transaction. This is the inevitable result of a conflict between three clear-cut views. One – the desire to reflect in costs and earnings statements the monetary income and disbursements of persons engaged in a fishery enterprise computed in accordance with accounting precepts; two – the economists' desire to measure capital consumption (and who will deny that capital consumption does take place every year despite a vessel's age or monetary valuation), and three – the advisability of adopting uniformity in charges as between one enterprise and another and adjusting values from their present accounting base to some hypothetical base in order to secure it. These needs are irreconcilable and no one way will completely satisfy all of them. *It is therefore recommended that for purposes of assessing depreciation, fishing vessels and other capital equipment, new or second hand, should be valued at the full purchase price and separate asset accounts should be*

maintained for at least the vessel hull and the engine. If the age of the vessel and its associated machinery are of an age whereby it could reasonably be argued that the capital outlay had been fully written off, no depreciation should be entered for that vessel, but a nominal valuation should be recorded for balance sheet purposes. Where some different standard is adopted for the assessment of depreciation, the notes to the costs and earnings study should indicate the basis used for valuation of capital assets and the broad extent to which the valuation so made differs from the valuation as it stands in the records of the owner. This additional information will enable a re-assessment of depreciation charges to be made by any reader who wishes to do so.

SUGGESTED SCALE OF DEPRECIATION RATES FOR FISHING VESSELS, ENGINES AND OTHER MACHINERY ON A STRAIGHT LINE BASIS, CALCULATED ON FULL PURCHASE PRICE

Vessels	Suggested Depreciation	(%)
New		
Powered by steam engine (oil or coal)	Hull	6 2/3
	Engine	6 2/3
	Other machinery or equipment	12 1/2
Powered by Diesel or Diesel-electric motors	Hull	6 2/3
	Engine	10
	Other machinery or equipment	12 1/2
Nonpowered	Hull	3 1/3
Second-hand		
Powered by steam engine (oil or coal), or Diesel or Diesel-electric	A graduated proportion of the purchase price depending upon the age of the vessel at the date of purchase. Vessels less than 5 years old can be depreciated as for new. Thereafter, the depreciation rate should be stepped up so as to write off a boat 20 years old (or older) on acquisition in not more than 3 years.	

8. PROVISION AND SERVICING OF CAPITAL

Capital structure

The fishery enterprise is frequently a small undertaking under the control of a working fisherman, or a partnership of working fishermen. The assets of the enterprise may have been handed down from an earlier generation and accounting records may be of the very scantiest. Administration, as known in business circles, will not exist, but the owner will generally have his finger on the pulse of things and run his business independently of authority so far as he is able. The financial structure will be of the simplest fixed assets consisting of a fishing vessel and gear, a number of debts owed and owing, and a reserve of cash. The cash reserve may be in the form of currency, or a balance held by a fish salesman, agent or bank. This is the lower end of the scale and on a simple numerical count the majority of fishery enterprises take this form. At the upper end of the scale there are a number of highly organized composite enterprises operating fleets of large vessels and employing several thousand people in fishing, fish processing, merchanting and the many activities ancillary thereto. The degree of concentration of the industry in the United Kingdom, for example, is best illustrated by the accounts of three public companies, predominantly engaged in the white fish industry which, between them, own assets worth £16 million. Corporations of this size are accountable to a large number of shareholders and the conduct of their affairs is in striking contrast to the layman's usual conception of a fishery undertaking.

Public companies and corporations, because they obtain their capital by public subscription, are under an obligation to make their balance sheets public. Their expansion and progress must be conditioned by the showing they make in their accounts and they must continuously be able to hold their place in competition with other industries for investors' funds. If such progress is not made, companies relying on publicly subscribed

capital will stagnate and ultimately face either liquidation or absorption by some other company whose profit-earning record is more impressive.

For many enterprises, however, sources of publicly subscribed capital are not available. Those undertakings which could convert themselves to publicly incorporated bodies are often reluctant to do so because it would involve a sacrifice of their traditional independence and make them more and more accountable to laymen. Certainly, the majority of enterprises, the small, working-owner type, would not wish to seek capital in this way nor would they be likely to succeed if they did. They lack, as a general rule, the financial resources to keep their vessels modern and to expand their businesses so as to give a wider spread of risks. In an industry which has now become "capital expensive," the problem of capital provision has become acute and governments have found it necessary in some countries to help in various ways by the payment of grants, the provision of long-term loans (some of them have been at no interest or preferential rates of interest for part of the time), and special forms of tax relief. Where these financial aid schemes are for the benefit of industry in general, they give no added advantage to the fishing industry. But they are more often than not specifically directed to the fishing industry and this gives fishermen an advantage because of the lower capital servicing charges they are required to meet. It is not usual to attempt an evaluation of the particular benefits received by way of preferential capital assistance and, in such costs and earnings surveys as are carried out, this aspect has, perhaps, not been developed to the extent it might be.

Capital-raising charges

A number of charges result from the raising of capital. These will include the cost of technical surveys and valuation, the legal charges for the preparation of mortgages or other forms of securing debt, and the payment of interest, all of which should be charged as operating expenditure for the period in which they are incurred. *Only the natural disbursements by an enterprise should be charged; no notional charges, such as a charge for interest on the capital employed, should be entered as a matter of course*, though, naturally, there is nothing in this recommendation to preclude individual research workers from calculating such charges in their study appraisal.

Capital surplus ratio

The return on capital (or investment) ratio is a normal basis for the comparison of efficiency as between one business, or kind of fishing vessel, and another, and it is in this field where there is a need for useful criteria. There is some doubt as to what is intended by "capital employed" or "proprietors' interest," and the several bases which can be, and are, used, are designed to show ratios computed to serve some particular end. It is important, if costs and earnings studies are to yield helpful information on investment problems, to adopt a number of basic definitions and to express capital return ratios in a standard form. With the increasing governmental interest in fishery affairs, this need is becoming pressing.

Definition of capital employed

Capital employed may be defined as the aggregate current value of fixed and floating assets employed in an enterprise, excluding sums invested outside the business in some other enterprise. It therefore includes not only the equity of the proprietor, but loan and debenture capital. The proprietors' equity, or net worth, is represented by the total of the capital employed *less* loans and debentures. *The return on capital employed should be the trading surplus for a year calculated as a percentage of the capital employed. In calculating the trading surplus for this purpose, depreciation should be deducted, but interest payable should be ignored.* Thus, the capital surplus ratio is unaffected by the method of financing and enables a fairer comparison to be made between different enterprises. The purpose of assessing the ratio is to measure the efficiency with which a given stock of capital has been utilized during a trading year, and this cannot be done effectively if interest is deducted from the trading surplus. [27]

Disposal of surpluses

In many costs and earnings studies the disposal of the trading surplus appears to have been ignored. The creation of a trading surplus is in itself only a stage, although admittedly a late stage, in the operation of an enterprise, and the way in which the surplus is distributed among those owning or lending the capital seems to offer considerable scope for further

[27] This does not mean that interest is ignored, but that it is convenient to omit it here.

research. The excellent reports on studies carried out by the Canadian Department of Fisheries contain more information about investment, sources and method of financing than is customarily available in costs and earnings surveys, but there is no reason why other countries should not attempt less ambitious analyses. Any summary of investment should distinguish between grant, loan and proprietors' equity.

Interest payable (as distinct from interest paid) should be shown so that anyone wishing to include it elsewhere can do so.

In examining fishermen's attitudes toward new investment it is often rewarding to calculate the percentage return secured by a fisherman investor who has loan (and perhaps grant) facilities available to him. They illustrate the very real differences between the return accruing to:

(*a*) capital employed

(*b*) proprietors' equity

(*c*) outsiders' investment

9. NEED FOR SUPPLEMENTARY STATISTICS

The general need

The nett surplus accruing to a segment of the fishing industry, or to individual enterprises making up the segment, is a guide to efficiency, but in any comparative study the monetary return for fishing activity is conditioned, as with most forms of economic activity, by the extent of the effort devoted to it and the amount of the physical products which that effort secures. It is not therefore sufficient to know only the value of gross earnings, but to correlate that data with other data showing the vessel tonnage, particulars of crew, etc., and the utilization of the vessel during the period covered by the study.

The international organizations concerned with fisheries, e.g., the International Council for the Exploration of the Sea, by advocating the keeping of records, have indirectly done much to improve the standard of record-keeping and, as a result, have provided for economic research much of the data principally demanded for scientific research. As has become increasingly recognized, the joint demand for data needs to be co-ordinated, and adequate measures of fishing productivity should be evolved and accepted in international usage.

Kind required

For economic purposes the usage of fishing equipment, including vessels, will need to be measured not only by absolute statistical count but by time.

It is desirable therefore to know how many trips the vessel made; the number of days (or if the fishing trips are short, the number of hours) away from port; the quantity of gear in use and the time it was actually engaged in fishing operations; the length and tonnage of the vessel and the

horsepower of its engine; the quantities of fish taken, analyzed by species if practicable; the personnel on board and a broad description of the duties to which they are allocated; and the base port and port at which fish is landed. (These will frequently be the same port but they sometimes differ and consequently have an important bearing on costs.)

Availability

How far this kind of information is likely to be available usually depends, as with other information on costs and earnings, upon the size of the enterprise, the co-operation which is engendered among the fishermen themselves and the impetus afforded by the dynamism of those seeking the data. Every encouragement should be given to fishermen to keep statistical data even though at first they may feel there is little purpose in it. In some countries of course government officers are able to obtain this information daily by interview with the fishing captains themselves and if this is done immediately or shortly after the boats arrive its accuracy is probably substantial. Reliance on memory for some of the more detailed information, such as fishing hours, cannot be expected to yield very satisfactory results if there is too long a time lag after the event, except where the fishing procedure follows so closely to an established and uniform pattern that the statistical return is not subject to any significant variation from one day, or one trip, to the next.

Importance of derived statistics

A useful and simple expedient for the measurement of productivity which is often the dominant factor in costs and earnings studies, is the physical output per days fishing, which can be modified to take account of the size of the vessel by calculating the fishing output per ton per day. This sort of derived statistic can also be computed in terms of money since there is quite frequently an inverse correlation between low physical productivity and a high price level (due to market shortages or differences in species), which makes the money value a better index.

The place, the time actually spent fishing and the yield of fish gives an index showing with what success different vessels or different kinds of gear are worked on different grounds, because it eliminates the effect of steaming time to the grounds and back, or from fishing ground to another, which is inherent, of course, in the sea day calculation. It enables useful obser-

vations to be made on the cost advantage or disadvantage of working highly productive distant grounds and low productive near grounds; and if bad weather is a persistent seasonal enemy of fishermen resulting in lost fishing time (but not sea-time) estimates can be made of the cost to the enterprise of such factors and their effect from year to year on productivity. The numbers of personnel on board need to be known for the purpose of establishing another index of productivity – the output per man day – and for relating numbers to remuneration paid out.

Added refinements, such as the running hours of engines, and the physical fuel consumption are useful but less essential. If items of data such as this can be obtained they clearly add to the value of the study, but they should be sought only if they do not prejudice the collection of the more important data, such as that directly indicative of fishing effort. The principal use of most of these statistics is for the derivations which can be obtained from them rather than for the value of the absolute statistics themselves.

10. METHODOLOGY IN THE CONDUCT OF ENQUIRIES

Study of objectives

It is a prime necessity to define the objectives of a costs and earnings study because the objectives will determine the scope of the study, the format of the questionnaire or other instrument used for the collection of data and the format of the report on the study itself. If the study is primarily directed toward the level of nett remuneration of owners and crews the task will be approached somewhat differently from one in which the principal concern is the effect of different kinds of gear on prices and gross earnings. Objectives vary a good deal not only between one country and another, but between studies initiated by different organizations and official bodies, and although every opportunity must be taken to apply the results of costs and earnings studies to multifarious uses, it is rare that a study conducted for one purpose will provide just that sort of data required for another. There may be hidden dangers in using such data without a clear appreciation of their content and limitations. Where it is desirable or necessary that studies should simultaneously serve a number of objectives, it is often better to sacrifice some items of otherwise necessitous information in order to avoid making the questionnaire or other record inordinately long and perhaps complicated. The appearance of a far too detailed and quite formidable list of questions often creates antagonism in the minds of fishermen toward any sort of enquiry and this is quite the wrong way to approach a problem which requires above all their active co-operation.

Reliability of data

Reliability of data is obviously desirable if the conclusions to be drawn from a study are to possess authenticity and the results defended against criticism. But the degree of reliability may be given some elasticity. There

is a real danger in limiting data only to that found to be absolutely reliable, of unnecessarily restricting the field of enquiry and perhaps introducing an unintentional bias into the results by so doing. There is, therefore, good reason why data of less than absolute reliability should not be discarded.

Sampling procedure

The statistical population about which data is required is frequently large – too large to approach in its entirety. Thus, for reasons of cost and convenience, sampling methods are involved for obtaining information about costs and earnings. One of the first problems encountered in the application of sampling techniques is to define the population and quite often this is most difficult. Even in advanced countries – the United Kingdom, for example – no sound data exist regarding the population of small vessels actually engaged in sea fishing as distinct from craft capable of being so utilized. A thorough knowledge of local conditions is an invaluable asset and as a prelude to many costs and earnings studies some field work directed to finding out more about the population can be rewarding. It can simplify the task of deciding on the sampling method to be employed and of drawing the sample itself. If adequate population records are already available, such pre-study enquiries as are necessary can normally be carried out by post.

The total population of fishing vessels (or other forms of enterprise) can, of course, be broken down into segments. A useful method of doing this is by reference to the kind of fishing carried on. The species caught, or the type of gear or size of vessel used, can be the most useful criteria, but there are other means, such as by reference to the particular waters fished, or to whether the fishing is carried on inshore or offshore, and local custom may help in determining which of these several criteria is the best to use. [28] The stratification of the vessel population facilitates the drawing of reliable samples and, if the segments of the population have been adequately defined, random sampling is as good a method as any to be employed. Alternatively, purposive sampling can often be employed with advantage, particularly if one of the purposes of the study is to develop cost and earnings figures for " ideal types " or, as they are sometimes

[28] In some countries ethnic background may be important. As with the sampling technique itself the real test is the test of experience.

called, " goal operations. " The criteria for selection in these cases may be maximum levels of productivity or other tests of maximum efficiency in operations. Cost analyses of this character can be used to provide fishermen with cost data against which they can check the efficiency of productivity of their own operations. Plans to employ conventional sampling techniques may be rendered largely abortive by the absence of suitable records relating to the operation of many of the fishing enterprises in the sector under study. In these circumstances, it is important to attempt some measurement of the effect of the absence of records on the sample and the sample results. Absence of fishing records can introduce serious bias and *it is, therefore, recommended that accurate statistical records should be kept of the progress of sampling and of the effective response secured.*

Constant samples

If the costs and earnings studies are of a continuous nature, the existence of a fairly substantial constant element in the sample can add reliability to the year-to-year comparisons of results. But the use of a large, constant sample over a period of years may hide the effect of technical innovations in a new construction, besides presenting results which are representative of an aging section of the population. The sampling procedure employed should, therefore, take account of the need to identify that portion of the sample which is constant, at least from one year to the next, but should not purposely aim at obtaining a long-term series of results for a substantial constant element, and the use of the word " constant " should not be construed as meaning anything more than constant over a year or two. If the results of a sample survey are compiled as a fairly long series, then the extent to which they contain a high proportion of enterprises common to the whole series might usefully be noted.

Choice of method

The cost of collection of data in any study is of considerable importance and, as the use of questionnaires issued and returned through the post is among the cheaper methods of collection, it is natural to use that method whenever possible. A prerequisite for proceeding in this manner, however, is that respondents are of a generally good standard of intelligence, are administratively sufficiently organized to provide the data required, and evince enough interest in the study to give the information without bias.

Where these conditions are not fulfilled, the issue of questionnaires in conjunction with subsequent visits by field workers or personal interviews by field workers without the issue of a questionnaire must be resorted to. The use of field workers, however, can become very expensive and substantially add to the average cost of collection per enterprise. Persons undertaking the field work, if already knowledgeable about the industry, in particular that segment of it which is being studied, can usually obtain all the basic data required and are able to give some estimate of the value of the information obtained in terms of its statistical reliability. There is not necessarily any greater value in data collected by field workers from doubtful sources than in data collected by questionnaire from unimpeachable sources. The choice of method is governed by necessity and cost but, where record keeping is known to be poor or unreliable, the collection of data through field workers, familiar not only with the industry but with the fishermen, their haunts and their local problems, will add to its value and eliminate much subsequent vetting and investigation in later stages. This familiarity of field workers with fishermen also does much to remove the feeling of distrust which so often pervades the relationship between fishermen and authority.

Common periods

It is common practice to ask for data in respect of a period common to the whole sample and this is of great value, particularly when comparing the results of different sections of the industry, or using the study results in conjunction with other statistical data, especially national income figures. Whenever it is possible to do so, the data should relate to a common period, but if they do not, the study should draw attention to this and give some approximation of the range of periods covered and the probable impact of the deviation from a common period on the validity of the results as a whole. This can be of great importance where government schemes with monetary or purely administrative implications are involved and where changes in those schemes have occurred during the period covered by the study. In any event it is important to minimize the time lag between the end of the period and the collection of the information. Approximate figures substantially correct, but provided soon after the end of a period are preferable to audited figures given twelve months later.

Common method of recording

Where fishermen and fishing enterprises can be encouraged to keep their records in a form designed to facilitate the summary or ready extraction of costs and earnings data the period aspect can be taken into account when designing the record form. It is not always possible to introduce and ensure the employment of bookkeeping methods such as those sponsored in the Netherlands by the Agricultural Economics Institute or in Japan by the Government or the more simple one in the United Kingdom by the White Fish Authority. But the use of simple methods involving little cost can often be promoted with little difficulty and the outlay is frequently well rewarding. If fishermen are to be encouraged to keep records – a task they seem to dislike – they must be persuaded of the practical value of the effort from their standpoint. Also, to keep up their interest and to forestall discontinuance of bookkeeping, it is advisable to make the enquiries continuous. The other advantages of continuity in enquiries are that techniques in conducting such enquiries gradually improve, trends are clearly identified and correlated with other economic statistics. Ultimately, the data will help to provide a continuous audit of the efficiency of the fishing fleet.

Vetting and analysis

The success which attends the results of a costs and earnings study will depend very largely on the way in which the preliminary survey has been carried out, the design of the forms used, their clarity, the clearness of notes given for guidance in compiling the form, and the procedure used for collection of data, vetting and coding. If bias is detected – and it may well become evident in individual returns, or in batches of returns – some adjustments may be called for, or even the exclusion of the offending returns. Care must be taken to distinguish between bias and unusualness. Returns should not be rejected simply because some item of expenditure appears unusually large, or because the earnings and surplus seem substantially out of line with other returns for similar fishing. In random sampling such rejection of returns would be defeating the purpose of the technique. But there are some kinds of return which need to be eliminated and they will relate more often than not to enterprises not conforming to the requirements of the study objectives. If, for example, the study is directed toward an examination of the earnings of North Sea herring drifters, it would be quite incorrect to include data relating to vessels drift-

ing for sprats. If, however, the study were more concerned with industrial fishing, i.e., fishing for raw material for manufacture of fish meal or similar end use, a different criterion should be applied. These processes of searching for and eliminating bias, of detecting and investigating errors and discarding data relating to enterprises not conforming to the requirements of the study objectives must be kept quite separate.

The task of analyzing all the data received will be greatly facilitated by the use of mechanical means, such as punched cards, but the importance of making sure that the data have been properly vetted and correctly coded before the punching takes place cannot be too strongly emphasized. The coding of data is necessary to accommodate on a numerically punched card what is required to be analyzed. This is quite different from any coding which may be necessary in order to conceal the identity of contributors. The need for this latter form of coding may be dictated by arrangements already made with the contributors or their representatives; or it may be dictated by law. It is helpful, though sometimes a lengthy and inconvenient task, to keep the same code from year to year for each enterprise.

11. ANALYSIS AND PRESENTATION OF DATA

Dissemination of study data

The purpose of conducting surveys into fishery costs and earnings is not just for the purpose of determining the absolute level of income and expenditure in a sector of the economy (though that can be an important end), nor simply the assessment of the wages and profits of fishermen. The principal need at the moment seems to spring from governments, who require the information for such diverse purposes as the administration of financial aid or price support schemes, fleet modernization programs, import tariffs, assessment of capital requirements, and studying the effects of technical innovations. These examples are sufficient to show that costs and earnings data do not serve a single end. Even so, the uses to which the data are put are often unnecessarily limited and by greater attention to analysis and presentation could be used as instruments of management to a fuller extent than they are at present. A wider dissemination of costings data should prove generally beneficial, and fishermen and others charged with the responsibility of taking decisions should therefore be encouraged to use such information in arriving at the decisions appropriate to their level of management. [29]

The wider circulation of data, which are inherently of a private and confidential nature, is not without some danger. It might lead to the disclosure of the results of a particular enterprise, [30] and the data themselves might be misinterpreted. In presenting costs and earnings information to fishermen, or indeed, preparing it for any published purpose, the analyses should therefore be done in a way which will effectually dissemble the identity of

[29] It is intended here to distinguish between the entrepreneurial management of a business and the government management of a fishery by regulatory means.

[30] In some countries disclosure is forbidden or restricted by statute. In others, undertaking given to respondents limit both the field and form of disclosure.

individual enterprises; and particular care should be exercised to see that the information is clearly and succinctly expressed, couched in terms and phrases which the recipients will readily understand and devoid of ambiguity.

Comparative statistics

Insufficient attention has so far been given to the need for cost comparisons to be made in terms of physical units and this point was raised in a paper submitted by S. Łaszczynski [31] to the Technical Meeting in London, in September 1958. The need for statistics relating to physical measurements of input and output has already been discussed in Chapter 9, but the ultimate value, which these additional data add to the study, will depend on their analysis and presentation and, in particular, on the extent to which they are used to produce derived statistics. Study reports, which do not make use of the data in this way, fail in one of their principal objectives.

Wherever possible statistical analyses should be presented against a background of comparability which will facilitate a correct assessment of performance and this might be the results of earlier years of similar vessels or of targets. For comparisons by fishermen the " target " basis might be considered the most practical. From a psychological point of view a comparison with figures which relate to average performance is unlikely to achieve the same sort of industrious and ambitious approach which might be engendered by the use of targets. Indeed, any fisherman who was of above average performance might lose incentive to strive for improvement.

Classification criteria

The practical problems of data analysis are exacerbated by the fact that the primary sphere of fishing activity contains many kinds of fishing vessels and fishing gear, some directed toward the capture of particular species, while others are of a more general nature, or nondiscriminatory. The subclassification of the primary phase is therefore essential.

There are, of course, several criteria which can be applied in determining the classifications to be made. Principally, the broad divisions of the species fished provides a useful starting point and this can be further classi-

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[31] S. Laszczynski. *Fundamental Activities of the State in the Fisheries of Poland.* Polish Sea Fisheries Institute.

fied by types of gear and by size of vessel. Care must be taken to avoid repetitive analysis which leads to numerous combinations, for in doing this the size of subsamples is likely to be so diminished as to reduce their value seriously.

An example of classification in the British fishing industry is given below. The principles of this classification can similarly be applied in other countries. The vessel classes and descriptions will differ, so too, will the classification by species but, fundamentally, the approach is likely to be the same.

Primary classification		*Subclassification*
Herring fishing	drifters ring netters trawlers	By motive power, by vessel length (10-ft. or 3-m. intervals). Or by type of motive power by horsepower.
White fishing	trawlers liners seiners pareja factory trawling	The same as for herring fishing, but additionally grouped into inshore, offshore and distant-water fishing.
Salmon fishing	netting lining	
Shell-fishing	nephrop trawlers pots and creels dredging hand-picking beam trawlers	By nature of fishing instrument, e.g., cart, vessel, or team of fishermen.
Others	trout farms oyster culture	——

If information about the regions fished is available and the costs and earnings data are separable, the economics of fishing one region can usefully be measured against those of another. Mixed interregional fishing without any fixed seasonal pattern, however, makes this kind of comparison difficult, and in some cases quite impossible.

The introduction of fishery regulatory measures are in most cases the result of scientific investigations and the need to conserve fish stocks. Very

little analytical work has been done on the economic effects of the various regulatory measures which have been implemented either nationally or internationally. With the expansion of the activities of international bodies concerned with conservation and resultant proposals for regulatory schemes, the success of such measures needs to be examined in the light of their economic effects and this thought should stimulate the collection and analysis of suitable costings data. It should thereafter be possible for economic considerations to be given greater weight if reliable evidence can be adduced to predict the likely effects of any proposed measures.

The number of factors influencing costs and earnings is clearly substantial. The size of vessel is not the only, or indeed, principal factor, for it would be found on closer examination that the kind and capacity of its motive power, vessel design and speed or fishing style, e.g., over the side trawling or stern trawling, the kind of gear used, customary voyage time, and fish-handling procedure, affect costs and earnings. The effect is not always simple. There may be compound effects, such as the use of a high-powered engine which enables trawling to be carried out more efficiently and with resultant greater yield, and also permits voyage time to and from fishing grounds to be reduced. For the additional capital expenditure in acquiring such a more powerful engine and the additional revenue cost in running it, the owner would expect to receive a more than proportionate increase in fishing earnings. These would normally be obtained from a larger catch, and a better price because of the reduction in voyage time. [32] Complicated factors such as these are better dealt with as case studies and no general examination of data down to this degree is called for in routine analysis.

Industrial fisheries are usually conducted quite separately from fisheries prosecuted for food and the principal considerations of this kind of fishing are a high catching rate and a large and continuous supply of fish. Fish handling and landed quality are relatively unimportant, but inherent features of the species caught, e.g., oil content, assume greater importance since they will have a material effect upon the quality of the meal and oil produced. Data analysis for purely industrial fisheries is, therefore, simplified and can follow very much the pattern of costing and control techniques developed for industrial enterprises generally.

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[32] The length of voyage time is often an important factor in price determination as observations and enquiry at some English ports has shown.

Uniformity of presentation

The more widespread use of costs and earnings data, to which added impetus has been given by the activities of organizations such as FAO, necessitates a critical appraisal of present practices. *It is desirable that member countries, for example, should aim to secure uniformity not only in definitions, but in presentation.* There are clearly two fields into which the kind of information likely to be produced can be divided: (*a*) the type of information supplied at irregular intervals for particular purposes, and (*b*) the information contained in study reports rendered at regular intervals in forms which become more or less standardized. It is division (*b*) which is the more susceptible of improvement and standardization on an international plane.

Each report (and data summary where appropriate) should bear an apt title and should show clearly the period of time to which it relates, the currency and/or weight units used, the author's department, or branch of government, and the purpose for which the report has been prepared. Simplicity in style, layout and working should be preserved in so far as this is compatible with the subject matter. The inclusion of an appendix giving details of the sampling methods used, the coverage and a statistical appreciation of the limits of accuracy, is useful where this is not dealt with in the report itself. A further useful addition, given by most originators of study reports, is a specimen of the data collecting documents and a description of the terminology used. *Until such time as the use of generally agreed definitions becomes universal, this practice should be continued and those countries not in the habit of including such appendices should give early consideration to the desirability of their doing so.* The value of this to those desirous of making intercountry comparisons is inestimable and frequently gives scope for the adjustment or rearrangement of costings summaries to bring them into uniformity.

Graphic and diagrammatic forms of presentation are deservedly popular for they allow a ready and usually easily understood appreciation of the facts which they portray. Wherever the data lends itself to presentation in graphic form this medium should be employed for at least some part of the study report, but care should be exercised in the choice of scales, for bad scaling can result in a distorted and misleading picture.

SPECIMEN FORMAT FOR SUMMARY INFORMATION OF LARGE WHITE FISH TRAWLERS OVER 500 TONS GROSS, WITH CREWS ENGAGED FULL TIME

Period ..... Base Area or District .....

	Steam Vessels	Diesel Vessels	Diesel-electric Vessels
Earnings			
Gross fishing earnings			
Subsidy receipts			
Other income			
Total Earnings			
Expenditure			
Fuel and lubricating oil			
Ice			
Hire charges for equipment			
Boxes, baskets, etc.			
Food			
General seagoing stores and sundries			
Maintenance and Repairs			
Vessel hull			
Main engine			
Other machinery			
Catching gear			
Fishing aids, and navigational equipment			
Shore Costs			
Wharfage and dock rentals			
Unloading labor and other unloading charges			
Fish selling			
Marine insurance			
Administrative Expenses			
Total Operating Expenditure			

Remuneration to Crews	No.	Currency	No.	Currency	No.	Currency
Skippers (or captains)						
Mates						
Others						

Depreciation			
Vessel hull			
Main engine			
Other equipment			
Owners' Surplus			
Interest Payable			
Statistical Data			
Number of vessels in sample			
Sampling fraction			
Aggregate weight of fish landed			
Aggregate number of days absent from port			
Aggregate hours trawling			
Aggregate number of landings of fish			
Regions fished and number of voyages to each			

SPECIMEN FORMAT FOR SUMMARY INFORMATION RELATING TO MIXED SHELL* AND WHITE FISHING – SMALL VESSELS UNDER 15 TONS GROSS

Period ..... Base Area or District .....

	Powered Vesssel		Nonpowered Vessels	
Earnings				
Gross fishing earnings:				
Shellfish				
White fish lining				
Subsidy receipts				
Other income				
Total Earnings				
Expenditure				
Fuel and lubricating oil				
Bait				
Maintenance and Repairs				
Vessel hull				
Main engine				
Other machinery				
Fishing pots, storage, pots and other shellfishing gear				
Fishing lines and hooks				
Shore Costs				
Wharfage and dock rentals				
Unloading labor and other unloading charges				
Fish selling				
Marine insurance				
Other shore sundries				
Total Operating Expenditure				
Remuneration to Crews	No.	Currency	No.	Currency
Skippers (or captains)				
Others				
Depreciation				
Vessel hull				
Main engine				
Other equipment				
Surplus before Interest				
Interest Payable				
Disposal of Surplus				
Skippers (or captains)				
Other crew members				
Shore owners (including corporations)				
Statistical Data				
Number of vessels in sample				
Sampling fraction				
Aggregate weight of fish landed				
Shellfish				
White fish				
Number of pot settings				
Average duration				
Number of hook settings				
Average duration				

* Described as appropriate to the particular fishery

SPECIMEN FORMAT FOR SUMMARY INFORMATION RELATING TO OYSTER FARMING

Period ..... Number of Enterprises ..... Area or District .....

Earnings

Sales of fattened oysters . . . . . .
Changes in stocks at valuation (+) or (–) . .

Expenditure

Immature oysters for laying . . . . . .
Boat expenses . . . . . .
Labor . . . . . .
Rent . . . . . .
Cleansing and purification plant . . . . . .
Transport . . . . . .
(Administration, including management expenses and salaries) . . . . . .
Total expenditure . . . . . .
Depreciation of plant and equipment . . . .
Owners' surplus . . . . . .
Interest payable . . . . . .

Statistical Data

Number of oysters sold . . . . . .
" planted . . . . . .
" stocked at beginning of period . . .
" stocked at end of period . . . . .

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